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420 GPM PILOT PLANT POWDERED CARBON FLOW VARIATION STUDY

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13. ABSTRACT *(Maximum 200 words)*
THE PURPOSE OF THE POWDERED CARBON FLOW VARIATION STUDY WAS TO DETERMINE AND COMPARE THE CARBON BED HEIGHT SENSITIVITY FOR TWO DIFFERENT CARBON BEDS AT VARIOUS INFLUENT WATER RATES WITHOUT THE INFLUENCE OF A REPLACEMENT CARBON FEED RATE.

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420 GPH PILOT PLANT POWDERED CARBON FLOW VARIATION STUDY

APPROVED:

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420 GPH PILOT PLANT POWDERED CARBON FLOW VARIATION STUDY

1. Purpose - The purpose of the powdered carbon flow variation study was to determine and compare the carbon bed height sensitivity for two different carbon beds at various influent water rates without the influence of a replacement carbon feed rate.

2. Procedure

a. The chemical concentrations and their feed rates remained constant. The chemicals were injected with the agitator functioning.

b. The Erdlator was filled with influent well water through the downcomer.

c. Powdered carbon was introduced to the Erdlator through the downcomer.

d. The agitator and influent well water feed operations were continued until the carbon bed stabilized.

e. Various flow rates were introduced and maintained until a stable condition was established. Measurements were then made to obtain bed height.

g. Well water was transported in a truck tanker from the well location to Building 742. The water was unloaded from the truck and stored in 3,000 gallon storage tanks at the test site.

3. Test Conditions

a. Carbon bed composition -- a 20 pound and 30 pound bed of Hydro Darco C powdered carbon.

b. Influent water rates -- 1, 3, 5, 6, 7, and 7½ gpm.

c. Replacement carbon feed rate -- none.

d. Cationic solution -- 6 gm Catfloc/gal @ 25 CC/min feed.

e. Anionic solution -- 0.5 gm Hercufloc/gal @ 120 CC/min feed.

f. Water source -- water from wells PW 2 and 3.

4. Comments

a. The cationic and anionic solution concentrations and their feed rates were determined from previous runs as having demonstrated reliability and stability over the operating range of the experiment.

b. The 20 pound carbon bed displayed a uniform increase of bed height in relation to the change in water rate until the 5 gpm capacity was attained. At the 6 and 7 gpm water rate, the bed height increased rapidly, yet within the design operating parameters. Attempting to operate the water treatment plant above the design criteria revealed a drop in bed height of 2½" plus a turbid condition through the product water had set in, as shown at the 7½ gpm water rate (Incl 1).

c. Similarly, the 30 pound carbon bed displayed a uniform increase of bed height in relation to the change in water rate, except the uniformity extended to the 6 gpm water rate capacity. At the 7 gpm water rate, the bed height increased rapidly, yet within the design operating parameters. Although the bed deterioration is less than the 20 pound carbon dosage while operating above the design criteria, a turbid condition existed, plus a bed height drop of ¼" was noted at the 7½ gpm water rate (Incl 1).

d. Bed Height Data (inches)

Waterflow (gal/min)	Carbon Dosage 20#	30#
1	15 3/4	17 1/4
3	18 1/4	20 1/4
5	18 3/4	21 1/4
6	20 1/4	21 1/4
7	20 1/2	27 1/4
7 1/2	17	27

5. Conclusions

a. Recommend operating the 420 gph pilot water treatment plant at 5 gpm. The 5 gpm water feed rate shows the most stable condition at the highest feed to operate the pilot plant.

b. The larger carbon dosage presents a more uniform carbon bed height change in relation to water rate modifications.

c. The carbon bed heights degenerate above the design criteria of 7 gpm water rate.

d. Since this test was primarily run to evaluate the relation of carbon bed height sensitivity to various influent water rates, no replacement carbon feed rate nor filtration efficiency were evaluated.

e. Extrapolation of this test data would indicate that it is doubtful the 10,000 gph Erdlator could process water in excess of its rated capacity and may, in fact, be operationally stable over extended periods at a maximum rate of 8,000 gph.

f. Further tests will be necessary to fully evaluate the maximum potential of the system.

1 Incl
as

PROCESS TECHNOLOGY

420 GPH FLOW VARIATION STUDY